Impaired Waters – High Priority

Issue Statement
Some lakes and streams within the Bassett Creek watershed do not meet State water quality standards; some are listed as impaired for aquatic life function and recreational use due to pollutants such as nutrients, chloride, bacteria, and other stressors.

The Minnesota Pollution Control Agency (MPCA) administers the Federal Clean Waters Act (CWA) in Minnesota. In this role, the MPCA identifies and maintains a list of waterbodies that do not meet applicable state water quality standards adopted to promote intended waterbody uses including recreation, consumption of fish, and support of aquatic life. Waterbodies in the BCWMC not meeting applicable standareds are listed in Table 2-1 and shown in (cross reference inventory map).

The sources of water pollution in the watershed are many and varied. Potential pollutant sources include permitted point sources, potentially contaminated sites, leaking above- and below-ground storage tanks, unsealed wells, and non-point sources such as stormwater runoff. Internal loading of nutrients accumulated in lake sediments and from decaying aquatic plants can also be significant. For many BCWMC waterbodies, stormwater runoff is the major external contributor of pollutants. Pollutants in stormwater runoff include phosphorus and other nutrients, sediment, chlorides, oil, grease, chemicals (including hydrocarbons), metals, litter (e.g., plastics) and pathogens. Chloride loading from runoff carrying road salt applied to roadways, parking lots, sidewalks, and other paved areas throughout the winter months is also a significant pollutant source (cross reference to chloride issue).

Table 2-1 Summary of Impaired Waters within the BCWMC (draft 2024)

Waterbody	Impaired Use	Pollutant or Stressor
Parkers Lake	Aquatic Consumption	Mercury in Fish Tissue
	Aquatic Life	Chloride
Medicine Lake	Aquatic Consumption	Mercury in Fish Tissue
	Aquatic Recreation	Nutrients/Eutrophication
	Aquatic Life	Fish Bioassessments
Sweeney Lake	Aquatic Life	Chloride
Wirth Lake	Aquatic Consumption	Mercury in Fish Tissue
	Aquatic Life	Chloride
Lost Lake	Aquatic Recreation	Nutrients/Eutrophication
Northwood Lake	Aquatic Recreation	Nutrients/Eutrophication
Bassett Creek (Main Stem)	Aquatic Life	Chloride
	Aquatic Life	Macroinvert. Bioassess.
	Aquatic Life	Fish Bioassessments
	Aquatic Recreation	Fecal Coliform
Plymouth Creek	Aquatic Life	Macroinvert. Bioassess.
	Aquatic Life	Chloride
	Aquatic Recreation	Escherichia coli
North Branch Bassett Creek	Aquatic Recreation	Escherichia coli
Sweeney Branch Bassett Creek	Aquatic Recreation	Escherichia coli
Spring Lake	Aquatic Life	Chloride

See also Table X.X in the Land and Water Resourve Inventory Appendix.

In lakes and wetlands, phosphorous is the pollutant of primary concern. As phosphorus loads increase, water quality degradation often accelerates, resulting in negative impacts such as excess algae growth or algal blooms (reflected in high chlorophyll a concentrations). Algal blooms and invasive aquatic plants (cross reference to AIS issue), such as Eurasian watermilfoil, purple loosestrife, and curly-leaf pondweed, can thrive and interfere with ecological function, recreational use, and the aesthetics of waterbodies. Some types of blue-green algae contain neurotoxins that can be harmful to people or pets if consumed. Sediment is also a pollutant of concern. Sediment can carry phosphorus and other pollutants that bind to it. Sediment contributes to poor water clarity that affects vegetation growth and deposits onto stream and lake beds, impacting aquatic habitat.

Additional Resources

- Water quality summaries and monitoring reports for BCWMC priority waterbodies
- MPCA Impaired waters list
- MPCA What's in My Neighborhood potential pollutant sources and environmental information
- Minnesota Stormwater Manual summary of common pollutants in stormwater

Trend analysis indicates declining water quality in Lost Lake.

Impaired Waters Desired Future Condition

Water quality in priority waterbodies meets or is better than applicable State water quality standards.

Impaired Waters Goals

WQ1: Achieve State eutrophication standards in Medicine Lake (see Table 2-2)

WQ2: Make statistically significant improvement in water quality toward achieving State eutrophication standards in Northwood Lake and Lost Lake (see Table 2-2)

WQ3: Maintain current conditions or improve water quality in priority lakes currently meeting State eutrophication standards: Cavanaugh Pond, Crane Lake, Parkers Lake, Sweeney Lake, Twin Lake, Westwood Lake, Wirth Lake (see Table 2-2)

Table 2-2 BCWMC Priority Lake Water Quality Compared to State Eutrophication Standards

Priority Lake	State Standard Total Phosphorus (ug/L)	Current Condition Total Phosphorus (ug/L)[1]	State Standard Chlorophyll *a* (ug/L)	Current Condition Chlorophyll *a* (ug/L)[1]	State Standard Secchi Depth (m)	Current Condition Secchi Depth (m)[1]
Cavanaugh Pond	60	39	20	9.1	>1.0	1.8
Crane Lake	60	28	20	7.0	>1.0	0.9[4]
Lost Lake	60	95	20	50	>1.0	0.8
Medicine Lake[2]	40	54	14	30	>1.4	1.8
Northwood Lake	60	223	20	72	>1.0	0.7
Parkers Lake	40	27	14	11	>1.4	2.8
Sweeney Lake[3]	40	34	14	14	>1.4	1.6
Twin Lake	40	15	14	3.6	>1.4	3.5
Westwood Lake	60	32	20	4.9	>1.0	1.3
Wirht Lake	40	28	14	8.1	>1.4	2.8

Red = does not meet standard/goal
(1) Based on summer average data collected 2013-2022 (will be updated with most recent data before plan adoption)
(2) Main basin
(3) North basin
(4) Crane Lake Secchi depth is limited due to dense aquatic plant growth

Impaired Waters Desired Future Condition

Water quality in priority waterbodies meets or is better than applicable State water quality standards.

Impaired Waters Goals (continued)

WQ4: Maintain or improve water quality in priority streams to achieve State eutrophication standards: Bassett Creek Main Stem, North Branch Bassett Creek, Plymouth Creek, Sweeney Branch Bassett Creek (see Table 2-3)

WQ5: Reduce sources of bacteria to priority streams: Bassett Creek Main Stem, North Branch Bassett Creek, Plymouth Creek, Sweeney Branch Bassett Creek

WQ6: Maintain total phosphorus loading to the Mississippi River of 0.35 lb/acre/year or less (as defined in the Lake Pepin TMDL)

Table 2-3 BCWMC Priority Stream Water Quality Compared to State Standards

Priority Lake	State Standard Total Phosphorus (ug/L)	Current Condition Total Phosphorus (ug/L)[1]	State Standard Total Suspended Solids (mg/L)	Current Condition Total Suspended Solids (mg/L)	State Standard *E. coli* (#/100 mL)[2]	Current Condition *E. coli* (#/100 mL)
Bassett Creek Main Stem	100	195	30	9.1	126	168
North Branch Bassett Creek	100	91	30	73	126	537
Plymouth Creek	100	227	30	50	126	853
Sweeney Branch Bassett Creek	100	101	30	30	126	257

Red = does not meet standard/goal

(1) Based on summer average data collected 2013-2022 for Main Stem Bassett Creek, 2018 for North Branch Bassett Creek, 2020 for Sweeney Branch Bassett Creek, and 2022 for Plymouth Creek

(2) 126 organisms per 100 mL as a geometric mean of not less than five samples within any month, nor shall more than 10% of all samples within a month exceed 1,260 organisms per 100 mL (note that BCWMC monitoring is limited to fewer than 5 samples per month)

Impaired Waters Desired Future Condition

Water quality in priority waterbodies meets or is better than applicable State water quality standards.

Impaired Waters Goals (continued)

WQ7: Maintain or improve macroinvertebrate indices of biological integrity (MIBI) in priority streams: Bassett Creek Main Stem, North Branch Bassett Creek, Plymouth Creek, Sweeney Branch Bassett Creek (see Table 2-4)

WQ8: Maintain or improve lake floristic quality indices (FQIs) and number of species (species richness) towards achieving State standards for aquatic vegetation in BCWMC priority lakes: Cavanaugh Pond, Crane Lake, Lost Lake, Medicine Lake, Northwood Lake, Parkers Lake, Sweeney Lake, Twin Lake, Westwood Lake, and Wirth Lake (see Table 2-5)

WQ9: Maintain or improve fish index of biologic integrity for applicable priority lakes (currently Medicine Lake)

Table 2-4 BCWMC Priority Stream Macroinvertebrate Data Compared to State Standards

Priority Stream	Location	State Std MIBI	Current Condition MIBI[1]	Years of Current MIBI
Bassett Creek Main Stem	East of Brookridge	≥37	22.9	2015, 2018
Bassett Creek Main Stem	Irving Avenue	≥37	22.0	2015, 2018
Bassett Creek Main Stem	Rhode Island Avenue	≥37	17.6	2015, 2018
North Branch Bassett Creek	34th Street	≥37	23.0	2015, 2018
Plymouth Creek	Industrial Park Blvd	≥37	15.9	2015, 2022
Sweeney Branch Bassett Creek	Woodstock Avenue	≥43	45.5	2015, 2020

MIBI = Macroinvertebrate Index of Biological Integrity
State MIBI standards are based on "general use" category for Class 5 southern high-gradient streams (MIBI = 37) or Class 6 southern forest low-gradient stream (MIBI = 43)
Red = does not meet standard/goal
(1) Based on average of listed years

Table 2-5 BCWMC Priority Lake Aquatic Macrophyte (Plant) Data Compared to State Standards

Priority Lake	State Std FQI	Most Recent FQI[1]	10-year Average FQI[2]	State Std Species Richness	Most Recent Species Richness[1]	10-year Average Species Richness[2]	Year of Most Recent Data	Years of Average Data
Cavanaugh Pond	>17.8	25.0	25.0	11	19	19	2019	2019
Crane Lake	>17.8	18.6	18.8	11	13.5	14	2021	2016, 2021
Lost Lake	>17.8	20.6	11.8	11	8.0	14.5	2022	2017, 2022
Medicine Lake	>18.6	27.6	25.3	12	21	23.5	2020	2016, 2020
Northwood Lake	>17.8	14.1	14.5	11	11.2	11	2022	2016, 2019, 2022
Parkers Lake	>18.6	19.5	18.9	12	13	13	2021	2018, 2021
Sweeney Lake	>18.6	25.2	21.7	12	15.3	19.5	2020	2014, 2017, 2019, 2020
Twin Lake	>18.6	28.3	24.7	12	19	23	2020	2014, 2017, 2019, 2020
Westwood Lake	>17.8	20.1	19.0	11	13.7	15.5	2021	2015, 2018, 2021
Wirth Lake	>17.8	--	--	11	--	--	--	--

FQI = Floristic Quality Index; FQI is a measure of the quality of aquatic vegetation

Red = does not meet standard/goal based on 10-year average FQI

(1) Reflects the average of June and August measurements during the most recent monitoring year

(2) Reflects average of all measurements in the 10-year period from 2014-2023

Tools to address Impaired Waters

The BCWMC implements several strategies and tools to address impaired waters and improve water quality. These tools are described in (see implementation section) and include:

Education and Outreach – The BCWMC and its partners share materials encouraging best practices that limit pollutant loading.

Monitoring – The BCWMC collects water quality data for priority waterbodies. The BCWMC reviews data to assess the condition of priority waterbodies and progress made towards BCWMC and/or State water quality goals.

Modeling and Studies – The BCWMC performs studies to evaluate sources of pollution and opportunities for treatment. The BCWMC maintains a **watershed-wide water quality model** to identify areas of high phosphorus and sediment loading ("hot spots") to target improvements and evaluate the water quality benefits of proposed improvement projects.

Project Review – The BCWMC evaluates development and redevelopment proposals for conformance with water quality performance standards to limit pollutant loading from the watershed.

Capital Projects – The BCWMC works with partners to implement projects to reduce pollutant loading to priority waterbodies from tributary watersheds and internal sources.

*The **Sweeney Lake Improvement Project** significantly reduced phosphorus, improved water quality, and supported a balanced aquatic ecosystem in Sweeney Lake. Regular monitoring from 1985 to 2018 indicated that total phosphorus concentrations exceeded the state standard of 40 ug/L 74% of the time. Further, the lake had a history of harmful algal blooms, negatively impacting the lake's recreational usability. Despite numerous best management practices installed or implemented in the lake's watershed over the years, water quality in Sweeney Lake had not improved.*

In 2018 the Sweeney Lake Association agreed to turn off the year-round aerators that had been running for decades, improving water quality. The BCWMC project further reduced total phosphorus in the lake with a combination of curly-leaf pondweed control in Sweeney Lake, carp management in upstream Schaper Pond and Sweeney Lake, and an alum treatment in Sweeney Lake.

Following the project, water quality in Sweeney Lake improved and the MPCA removed Sweeney Lake from the impaired waters list due to excess nutrients.

Chloride Loading – High Priority

Issue Statement
High chloride loading from use of winter deicers across the Bassett Creek watershed negatively impacts lakes streams, and groundwater water quality.

Chloride is toxic to aquatic life in high concentrations. The State has established surface water standards for chloride of 230 mg/L for chronic (long term) exposure and 860 mg/L for acute (short term) exposure. Data collected from Twin Cities Metro Area (TCMA) lakes, wetlands, and streams identified several waterbodies that exceed the State standard including the following (see also Table 2-1):

- Crane Lake
- Parkers Lake
- Spring Lake
- Sweeney Lake
- Wirth Lake
- Bassett Creek (Main Stem)
- Plymouth Creek

The use of sodium chloride (salt) as a deicing agent for winter maintenance of impervious surfaces such as sidewalks, parking lots, and roads is a significant source of chloride loading in the Bassett Creek watershed. As it melts snow and ice, chloride dissolves into the melted water and is transported in runoff to lakes, streams and wetlands. Residential water softeners may also be a significant source of chloride. In the BCWMC; chloride from water softeners is transported downstream to municipal wastewater treatment plants (WWTPs) that discharge to the Mississippi River. However, typically wastewater treatment is not effective in removing chloride.

Chloride is extremely persistent in the environment and is considered a "permanent pollutant" because it dissolves in water and there is no practical way to remove it. Protecting surface waters from excess chloride loading is more effective than restoring impaired surface waters (consider adding Parkers Lake Study as inset example). While only some BCWMC priority waterbodies are currently listed as impaired due to chloride, the BCWMC considers all waterbodies at risk due to chloride loading from the highly impervious land use throughout the watershed.

Additional Resources

- MPCA summary information about chloride as a stormwater pollutant
- Smart Salting training resources from the MPCA
- Twin Cities Metropolitan Area Chloride Management Plan

Desired Future Condition
Priority waterbodies meet applicable State chloride standards.

Chloride Goals

WQ10: Reduce chloride loading to/concentrations in lakes and streams at risk of chloride impairment and those not meeting State standards.

WQ11: Reduce average chloride concentrations in Bassett Creek by 10% at the Watershed Outlet Monitoring Program (WOMP) station.

Table 2-6 BCWMC Priority Waterbody Chloride Data Compared to State Standards

Priority Waterbody	State Chronic Std Chloride (mg/L)	Current Condition Average Chloride[1] (mg/L)	State Acute Std Chloride (mg/L)	Current Condition Maximum Chloride[1] (mg/L)	Number of Observations
Cavanaugh Pond	230	59	860	70	12
Crane Lake[3]	230	718	860	820	6
Lost Lake	230	31	860	33	12
Medicine Lake	230	162	860	375	318
Northwood Lake	230	104	860	274	12
Parkers Lake[3]	230	257	860	716	103
Sweeney Lake[3]	230	276	860	371	48
Twin Lake	230	117	860	139	26
Westwood Lake	230	81	860	99	12
Wirth Lake[3]	230	200	860	512	306
Bassett Creek Main Stem[2,3]	230	165	860	664	259
North Branch Bassett Creek	230	88	860	219	12
Plymouth Creek[3]	230	180	860	382	25
Sweeney Branch Bassett Creek	230	218	860	348	18

Red = does not meet standard/goal
(1) Based on all measurements 2013-2022
(2) As measured at watershed outlet monitoring program (WOMP) location
(3) A stream is considered impaired if two or more measurements exceed the chronic criterion within a 3-year period or if one measurement exceeds the acute criterion

Tools to address Chloride Loading

The BCWMC implements several strategies and tools to address issues resulting from chloride loading in the watershed. These tools are described in more detail in (reference implementation section) but include, briefly:

Monitoring – The BCWMC monitors chloride concentrations in its priority waterbodies to assess conditions and progress made towards BCWMC and/or State water quality goals. Chloride data is presented in Table 2-6.

Modeling and Studies – The maintains a land use-based chloride loading map to inform project and program decisions. Pollutant load mapping allows the BCWMC to focus resources in areas where benefits can be maximized.

Project Review – The BCWMC has established performance standards for development and redevelopment projects that promote the reduction of impervious area and other factors related to winter maintenance.

Education – The BCWMC works with partners to support training, communications, and other outreach promoting strategies to minimize the use de-icing salt.

*The **MPCA Smart Salting** program helps improve winter maintenance operator effectiveness and reduce chloride pollution while keeping roads, parking lots, and sidewalks safe. Participating organizations have been able to reduce their salt use by 30 to 70%. In addition, the training has been shown to prevent chloride contamination in lakes, rivers, and streams. More information is available at:* Smart Salting training | Minnesota Pollution Control Agency (state.mn.us)